HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, Colorado 80527-2400

PATENT APPLICATION

ATTORNEY DOCKET NO. 200207971-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Bill Eaton

Application No.: 10/670061

Filing Date: Sep 24, 2003

Confirmation No.: 5094

Examiner: Yixing Qin

Group Art Unit: 2625

Title: Variable Drive For Printhead

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on July 7, 2008.

[X] The fee for filing this Appeal Brief is $510.00 (37 CFR 41.20).

[ ] No Additional Fee Required.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

[ ] (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

[ ] 1st Month $120 [ ] 2nd Month $460 [ ] 3rd Month $1050 [ ] 4th Month $1640

[X] The extension fee has already been filed in this application.

[X] (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 510. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

Respectfully submitted,

Bill Eaton

By Timothy F Myers

Timothy F. Myers

Attorney/Agent for Applicant(s)

Reg No. : 42,919

Date : Sept. 5, 2008

Telephone : 541 715 4197

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of:	William S. Eaton	Art Unit: 2625
		Examiner: Qin, Yixing
Serial Number:	10/670,061	
Filed:	September 24, 2003	
Title:	VARIABLE DRIVE FOR PRINTHEAD	
Date:	September 5, 2008	

APPEAL BRIEF UNDER 37 CFR §41.37

TO THE COMMISSIONER FOR PATENTS:

Sir:

This Brief is submitted in support of the Appeal in the above-identified application.

1. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

2. RELATED APPEALS AND INTERFERENCES

There are no other prior and/or pending appeals, interferences, or judicial proceedings that are related to, directly affect, or that will be directly affected by or have a bearing on the Board's decision.

3. STATUS OF THE CLAIMS

Claims 1-24 are pending in the application.

Claims 1-24 stand rejected.

No claims were canceled.

No claims were allowed.

The rejections of claims 1-24 are appealed.

4. STATUS OF AMENDMENTS

No Amendments were filed subsequent to the Final Office Action.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

Claim 1

Claim 1 is directed to a driver circuit 100 for driving simultaneously a variable number of firing resistors (60 in Fig. 1) for a printhead (50 in Fig. 1) during a printing firing cycle. This driver circuit 100 includes a drive circuit (130 in Fig. 1, Fig. 4, and Fig. 9, see [0016], [0018], and [0022]) for supplying firing pulses (Fig. 5) for firing the variable number of firing resistors during the printing firing cycle. The driver circuit further includes a circuit (120 in Fig. 1 and Fig. 9, see [0017]) for adjusting a magnitude of a voltage (the offset generator 140 in Fig. 4, 140B in Fig. 6, 140 in Fig. 7) or a current (Fig. 7 and Fig. 8, see [0021]) of said drive signal during the printing firing cycle in dependence on the variable number of firing resistors [0020] to be fired simultaneously in a given subset (defined in [0016]) during the printing firing cycle.

Claim 8

Claim 8 is directed to a method for maintaining nominally constant energy in an individual load that is one of a set of firing resistor loads connected in parallel. The individual loads are connected a drive circuit via a switch to allow a variable number of the loads to be simultaneously connected to the driver circuit to receive energy pulses during a printing firing cycle. The method includes determining the variable number of the loads (see [0017] and Fig. 1, 120 the resistor sum block) to be simultaneously connected to an energy source (V_{fire} in Figs 1-5 and 8-9) for the printing firing cycle during a given subset of the printing firing cycle (see [0016]). The method also includes adjusting a voltage magnitude (the offset generator 140 in Fig. 4, 140B in Fig. 6, 140 in Fig. 7) or current magnitude(Fig. 7 and Fig. 8, see [0021]) of the energy pulse (Fig. 5) in dependence on the variable number during the given subset of the printing firing cycle (last sentence of [0015] and first two sentences of [0016], so that the voltage magnitude or current magnitude increases (see delta V column in Fig. 6 and V_{fire} signal in Fig. 3) as the variable number increases to maintain a nominally constant energy applied to the load independent of the variable number (see [0020] and V_{nozzle} signal in Fig. 3).

Claim 11

Claim 11 is directed to a method for driving an inkjet printhead (50 in Fig. 1) having a set of firing resistors (60 in Fig. 1), each responsive to a firing pulse (Fig. 5) for ejecting ink from a corresponding nozzle, the firing resistors ([0015]) connected in parallel (see Fig. 2), there being a parasitic resistance (64 in Fig. 2) effectively in series connection with said set of firing resistors, each resistor having an associated switch ([0019] and 62-1 to 62-n in Fig. 2) for connecting the resistor (60-1 to 60-n in Fig. 2) to a driver circuit 130 so that a variable number of the resistors can be simultaneously connected to the driver circuit to receive energy pulses (Fig. 5) during a printing firing cycle. The method includes determining the variable number of the loads (in resistor sum 120 in Fig. 1, see [0017]) to be simultaneously connected to the energy source (V_{fire} in Figs 1-5 and 8-9) for the printing firing cycle. The method also includes adjusting a voltage magnitude of the energy pulse (the offset generator 140 in Fig. 4, 140B in Fig. 6, 140 in Fig. 7) in dependence on the variable number during a given subset of the printing firing cycle, so that the voltage magnitude increases (see delta V column in Fig. 6 and V_{fire} signal in Fig. 3) as the variable number increases during the given subset of the printing firing cycle to maintain a nominally constant voltage (see [0020] and V_{nozzle} signal in Fig. 3) applied to the load independent of the variable number.

Claim 13

Claim 13 includes a driver circuit (100 in Fig. 1) for driving simultaneously a variable number of firing resistors (see [0016] - [0017]) for a printhead (50 in Fig. 1). The driver circuit includes a drive circuit (130) for supplying a drive signal (Fig. 5) for firing the variable number of firing resistors (60-1 to 60-n in Fig. 2) during a printing firing cycle. The driver circuit 100 includes a means for adjusting a magnitude of a voltage (the offset generator 140 in Fig. 4, 140B in Fig. 6, 140 in Fig. 7) or a current (Fig. 7 and Fig. 8, see [0021]) of said drive signal during the printing firing cycle in dependence on the variable number of firing resistors to be fired simultaneously in a given subset (defined in [0016]) during the printing firing cycle.

Claim 20

Claim 20 includes a driver circuit (100 in Fig. 1) for firing simultaneously a variable number of firing resistors (see [0016] - [0017]) for associated nozzles in a printhead (50 in Fig. 1). The driver circuit includes an energy source (VS in Fig. 4) for providing electrical power to fire said firing resistors (60-1 to 60-n in Fig. 2). The driver circuit also has a nozzle counter (120 in Fig. 1 and see [0021]) for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given printing firing cycle. It also has a programmable offset generator (140 in Fig. 4, Fig. 6, Fig. 7, and Fig. 8, and [0022], [0024]-[0026]) for generating an output control voltage or current dependent on said nozzle count during a given subset of the given printing firing cycle. Finally, the driver circuit has a drive circuit (130 in Fig. 1, Fig. 4, and Fig. 9, see [0016], [0018], and [0022]) having an output (V_{fire}) connected to a circuit output terminal for connection to the printhead (50 in Fig. 1), said drive circuit (130) for selectively applying variable voltage (the offset generator 140 in Fig. 4, 140B in Fig. 6, 140 in Fig. 7) or current (Fig. 7 and Fig. 8, see [0021]) from said energy source to the circuit output in dependence on said output control voltage or current during the given subset of the given printing firing cycle.

Claim 23

Claim 23 is directed to a driver circuit (100 in Fig. 1) for driving simultaneously a variable number of firing resistors (see [0016] - [0017]) for associated nozzles in a printhead (50 in Fig. 1). The driver circuit includes a voltage source (VS in Fig. 4) for providing electrical power to fire said firing resistors and a nozzle counter (120 in Fig. 1 and see [0021]) for determining a nozzle count of the variable number of nozzles whose resistors (60-1 to 60-n in Fig. 2) are to be fired in a given subset of a printing firing cycle. The driver circuit (100) also includes a programmable offset generator (140 in Fig. 4 and Fig. 6, Fig. 7 and Fig. 8) for generating an output control voltage (delta V in Fig. 4, Fig. 6, Fig. 6A, Fig. 7 and Fig. 8) dependent on said nozzle count during the subset of the printing firing cycle. Finally, the driver circuit (100) has a high side drive circuit (132 in Fig. 8, [0026]) having an output (V_{fire}) connected to a circuit output terminal for connection to the printhead (50), said high side drive circuit (132) for selectively

applying a firing pulse having a programmable magnitude to the circuit output (V_{fire}) in dependence on said output control voltage during the printing firing cycle or current.

6. GROUNDS OF REJECTION TO BE REVIEWED

Whether claims 1-24 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour et al. (U.S. Patent No. 6,318,828) further in view of Ahne et al. (U.S. Patent No. 6,409,298).

7. ARGUMENT

7A. Overview

The Supreme Court recently addressed the issue of obviousness in KSR Int'l Co. v. Teleflex Inc., 127 S.Ct. 1727 (2007). The Court stated that the Graham v. John Deere Co. of Kansas City, 383, U.S. 1 (1966), factors still control an obviousness inquiry. Those factors are: 1) "the scope and content of the prior art"; 2) the "differences between the prior art and the claims"; 3) "the level of ordinary skill in the pertinent art"; and 4) objective evidence of nonobviousness. KSR, 127 S.Ct. at 1734 (quoting Graham, 383 U.S. at 17-18).

Commonly assigned Barbour is directed to a printhead assembly that controls firing operations of an inkjet printhead. The control is done by the firing and timing decisions pertaining to ink drop ejection "through the use of various *types of delays*." (See abstract). Specifically, as noted in col. 5, lines 16-23, "The firing controller 130 includes a firing sequence sub-controller 150 for selectively controlling the sequence of fire pulses, a firing delay sub-controller 152 for reducing electromagnetic interference (EMI) in the processing driver head 120 and a fractional delay sub-controller 154 for compensating for scan axis directionality (SAD) errors of the driver head 126." In col. 13, lines 34-35, "Preferably, *the operating voltage is determined at the time of manufacture and is encoded in the assembly memory device*."

The Examiner in the "Response to Arguments" section of the Final Office Action, states that, "A new reference, Ahne et al (U.S. Patent No. 6,409,298) is used to teach the adjusting of a magnitude of voltage in dependence on the variable number of firing resistors to be fired." The Examiner further asserts that the combination of Barbour and Ahne "would suggest the currently claimed invention." Applicant respectfully traverses this assertion for the reasons given in the following arguments for each independent claim specifically.

Claims 1 and 13

For instance, previously presented claims 1 and 13 read as follows:

> 1. A driver circuit **for driving simultaneously a variable number of firing resistors** for a printhead during a printing firing cycle, the driver circuit comprising:
> a drive circuit for supplying firing pulses for firing the variable number of firing resistors during the printing firing cycle;
> a circuit for **adjusting a magnitude of a voltage or a current of said drive signal** during the printing firing cycle **in dependence on the variable number of firing resistors to be fired simultaneously** in a given subset during the printing firing cycle. (emphasis added to some distinguishing claim limitations)
>
> 13. A driver circuit **for driving simultaneously a variable number of firing resistors** for a printhead, the driver circuit comprising:
> a drive circuit for supplying a drive signal for firing the variable number of firing resistors during a printing firing cycle;
> means for **adjusting a magnitude of a voltage or a current of said drive signal** during the printing firing cycle **in dependence on the variable number of firing resistors to be fired simultaneously** in a given subset during the printing firing cycle. (emphasis added to some distinguishing claim limitations)

Neither Barbour nor Ahne, alone or in combination, teaches the limitations of claim 1 or 13. The Examiner specifically asserts that Barbour does not explicitly disclose "a circuit for adjusting a magnitude of a voltage or a current of said drive signal during a printing firing cycle in dependence on the variable number of firing resistors to be fired simultaneously in a given subset during the printing firing cycle." However, the Examiner states that Barbour does disclose in col. 25, lines 30-63 "the proper amount of voltage to deliver to the printheads." Further, the Examiner states that Ahne discloses in col. 5, lines 1-50 "the variation of voltages across heater resistors" especially in lines 13-20 and 42-50. However, the Examiner is misreading Ahne. Ahne is concerned with early life failures in printers due to heater resistances decreasing over time and thus increasing the energy delivered to them which may burn them out. Ahne solves this burn out problem by using a burn in operation during manufacturing or just after delivery to the customer. Ahne controls voltage to a single resistor at a time as Ahne measures the

resistance of a heater resistor until the resistance stabilizes (see Ahne abstract and Fig. 1). The firing voltage across the heater resistor is adjusted in order to maintain the desired current density through the heater resistor. Accordingly, Ahne is concerned with controlling voltages as the number of times a single resistor is fired and not for "**adjusting a magnitude of a voltage or a current of said drive signal** during the printing firing cycle **in dependence on the variable number of firing resistors to be fired simultaneously**." Since Barbour is concerned with *adjusting the timing and pulse width decisions* for correcting parasitic resistance (595 in Fig. 5 and col. 9, lines 3-9) and determining what the operating voltage of the printhead assembly should be at the time of manufacture and then encoding it in the assembly memory devices (col. 13, lines 33-36), there is no motivation to modify Barbour to make its operating voltage adjustable in dependence on the variable number of firing resistor to be fired without Applicant's specification as a guide, thus using improper hindsight. As noted, Ahne's voltage control circuit does not "adjust a magnitude of a voltage ... in dependence on the variable number of firing resistors to be fired simultaneously" as Applicant is claiming. Ahne is feeding back the resistance value not the "variable number of firing resistors to be fired" in adjusting its voltage, (see col. 4, lines 5-10).

Applicant also notes that it is improper to combine references where the references teach away from their combination. (In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)) This principle was cited with approval in the Supreme Court decision, KSR. The Supreme Court in KSR discussed in some detail United States v. Adams, 383 U.S. 39 (1966), stating in part that in that case, "[t]he Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious." Accordingly, it remains improper to combine references where the references teach away from their combination.

At most, a fair reading of the references by one of skill in the art would use the timing adjustment of Barbour to correct for parasitic resistances and add the adjustable voltage circuit of Ahne to burn in the heater resistors to a stable value to further help in resistor life failure. Neither Barbour nor Ahne teach now to adjust the voltage of the drive signal "in dependence on the **variable number** of firing resistors to be fired

simultaneously." Barbour discloses that the timing pulse width is set to correct for all resistors firing "during calibration," and not during printing operation, ("the setpoint voltage is stepped down until a suitable pulse width and printing performance is attained" (col. 29, line 62 to col. 30, line 1)).

As Barbour notes in col. 28, lines 54-57, "Part of the calibration process includes *establishing a setpoint voltage to provide a limited firing energy threshold for all firing conditions, **regardless of the number of nozzles fired simultaneously**.*" Thus, Barbour teaches away from Applicant's claimed language of " **adjusting a magnitude of a voltage ... in dependence on the variable number of firing resistors to be fired simultaneously.**" In addition, Barbour teaches away by using a varying pulse width rather than "adjusting a magnitude of a voltage" to adjust for parasitic resistance. Also, Barbour teaches away by using a maximum setpoint voltage that is determined in calibration "**regardless of the number of nozzles fired simultaneously**" and thus not "**in dependence on the variable number of firing resistors to be fired simultaneously**" as Applicant claims. Barbour states that the setpoint voltage "**maximum limit is necessary** because when excessive parasitic resistance is present, there is too large a difference in the amount of voltage applied to the print cartridge when all nozzles are firing and when only one nozzle is firing. (col. 30, lines 41-44). Ahne helps in resistor life improvement, but it does so by describing how to burn in heater resistors to a lower stable value so the energy density remains constant. Ahne does not teach its voltage circuit "adjusting a magnitude of voltage ...in dependence on the variable number of firing resistors to be fired simultaneously" as Applicant is claiming but rather adjusting a magnitude of voltage to maintain a constant current density in a resistor in dependence on the number of times a single heater resistor is fired until its resistance value is stable. Accordingly, claims 1 and 13 are not anticipated by and are believed patentable over Barbour in combination with Ahne for the aforementioned reasons.

Claims 8 and 11

Previously presented claims 8 and 11 read as follows:

> 8. In a printhead control apparatus comprising a driver circuit for providing energy pulses to a set of firing resistor loads connected in parallel, each load having a switch for connecting the load to the driver circuit so **that a variable number of the loads can be simultaneously connected to the driver circuit** to receive energy pulses during a printing firing cycle, a method for maintaining nominally constant energy in an individual load, the method comprising:
>
> **determining the variable number of the loads to be simultaneously connected to an energy source** for the printing firing cycle during a given subset of the printing firing cycle;
>
> **adjusting a voltage magnitude or current magnitude of the energy pulse in dependence on the variable number during the given subset of the printing firing cycle, so that the voltage magnitude or current magnitude increases as the variable number increases to maintain a nominally constant energy applied to the load independent of the variable number**. (emphasis added to some distinguishing claim limitations)

> 11. A method for driving an inkjet printhead having a set of firing resistors, each responsive to a firing pulse for ejecting ink from a corresponding nozzle, the firing resistors connected in parallel, there being a parasitic resistance effectively in series connection with said set of firing resistors, each resistor having an associated switch for connecting the resistor to a driver circuit **so that a variable number of the resistors can be simultaneously connected to the driver circuit** to receive energy pulses during a printing firing cycle, the method comprising:
>
> **determining the variable number of the loads to be simultaneously connected to the energy source for the printing firing cycle**;
>
> **adjusting a voltage magnitude of the energy pulse in dependence on the variable number during a given subset of the printing firing cycle, so that the voltage magnitude increases as the variable number increases during the given subset of the printing firing cycle to maintain a nominally constant voltage applied to the load independent of the variable number**. (emphasis added to some distinguishing claim limitations)

Neither Barbour nor Ahne disclose "determining the variable number of loads to be simultaneously connected to an energy source" as Applicant is claiming. The Examiner asserts that this limitation is disclosed in Barbour in"(column 28, lines 32-57 -

one example giving (sp) is when all resistors need to be fired)." Applicant traverses this statement. Barbour states "the printer can be calibrated by determining a nominal input voltage above a threshold necessary for simultaneous operation of a plurality of resistors" and "the system is calibrated to set a voltage power supply, VPS, to a level adequate to ensure adequate firing energy levels for full drop volume firing in "blackout conditions" when all resistors are fired simultaneously." Barbour at the end states, "Part of the calibration process includes **establishing a setpoint voltage to provide a limited firing energy threshold for all firing conditions, regardless of the number of nozzles fired simultaneously**." Accordingly, Barbour does not teach "determining the variable number of loads to be simultaneously connected to an energy source" as Barbour teaches setting the energy source to a setpoint voltage to provide a limited firing energy threshold ... regardless of the number of nozzles fired simultaneously. As such, Barbour teaches away from Applicant's claimed invention by "ignoring" rather than "determining" "the variable number of loads to be fired simultaneously."

Further, the Applicant is claiming "**adjusting a voltage magnitude or current magnitude of the energy pulse in dependence on the variable number during the given subset of the printing firing cycle**, so that **the voltage magnitude or current magnitude increases as the variable number increases to maintain a nominally constant energy applied to the load independent of the variable number.**" As noted for claim 1, "adjusting a voltage magnitude or current magnitude of the energy pulse in dependence of the variable number" is not disclosed, taught, or suggested by either Barbour or Ahne. In addition, Ahne discloses "lowering" the voltage applied to the resistor to maintain a nominally constant energy as the resistance of the resistor is decreased during burn-in to maintain a constant energy density (see block 90 in Fig. 4, "calculate new voltage needed to keep the same current with this new resistance"). The Applicant "increases" the voltage or current as the variable number increases because the increased number of resistors fired increases the current through the parasitic resistance and thus more voltage is dropped across the parasitic resistance thus the needed correction. Applicant is concerned about proper drop direction and not just resistor life as in Ahne. Accordingly, claims 8 and 11 are not anticipated by and are believed patentable over Barbour in combination with Ahne.

Claims 20 and 23

Previously presented claims 20 and 23 read as follows:

20. A driver circuit for firing simultaneously a variable number of firing resistors for associated nozzles in a printhead, the driver circuit comprising:

an energy source for providing electrical power to fire said firing resistors;

a nozzle counter for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given printing firing cycle;

a programmable offset generator for generating an output control voltage or current dependent on said nozzle count during a given subset of the given printing firing cycle;

a drive circuit having an output connected to a circuit output terminal for connection to the printhead, said drive circuit for selectively applying variable voltage or current from said energy source to the circuit output in dependence on said output control voltage or current during the given subset of the given printing firing cycle. (emphasis added to some distinguishing claim limitations)

23. A driver circuit for driving simultaneously a variable number of firing resistors for associated nozzles in a printhead, the driver circuit comprising:

a voltage source for providing electrical power to fire said firing resistors;

a nozzle counter for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given subset of a printing firing cycle;

a programmable offset generator for generating an output control voltage dependent on said nozzle count during the subset of the printing firing cycle;

a high side drive circuit having an output connected to a circuit output terminal for connection to the printhead, said high side drive circuit for selectively applying a firing pulse having a programmable magnitude to the circuit output in dependence on said output control voltage during the printing firing cycle or current. (emphasis added to some distinguishing claim limitations)

The Examiner asserts that Barbour discloses a "nozzle counter" in col. 25, lines 30-63. Applicant respectfully traverses this statement. Barbour discloses an

"address counter" that "steps through the 16 addresses and indexes which address is firing in that primitive because **the addresses are fired one at a time**." Accordingly, a count of a variable number of nozzles to be fired are not counted but the address counter simply increments or steps through the 16 addresses (one for each nozzle of the primitive). Accordingly, this limitation of " **a nozzle counter for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given subset of a printing firing cycle"** is not disclosed, taught, or suggested by Barbour. Nor is it inferred that it is disclosed, taught, or suggested by Ahne, which Ahne of course does not do.

Nor does Barbour disclose " **a programmable offset generator for generating an output control voltage or current dependent on said nozzle count during a given subset of the given printing firing cycle**." If Barbour does not disclose a nozzle count, it can not disclose the programmable offset generator generating an output control voltage **on said nozzle count**. The Examiner asserts that Barbour discloses such in col. 29, lines 39-47 ("the margin of safety is an offset set, so that the resistors are properly fired"). As noted, Barbour in col. 28, lines 54-57 states, "Part of the calibration process includes establishing a setpoint voltage to provide a limited firing energy threshold for all firing conditions, **regardless of the number of nozzles fired simultaneously**." Therefore, Barbour teaches away from "generating an output control voltage ... **dependent on said nozzle count**" as Barbour establishes it "regardless of the number of nozzles fired simultaneously." Accordingly claims 20 and 23 are not anticipated by and are believed patentable over Barbour in view of Ahne.

9. Conclusion

For the reasons set forth above, a prima facie obviousness rejection has not been established for any claim. All rejections have been shown to be improper. Appellant respectfully believes that all pending claims patentably and non-obviously distinguish over the references of record and that the rejections should be reversed. Appellant respectfully requests that the Board of Appeals overturn the Examiner's rejections and allow all pending claims. An early allowance of all claims is earnestly solicited.

Respectfully Submitted,

William S. Eaton

By: Timothy F. Myers

Timothy F. Myers
Patent Attorney
Registration No. 42,919

Hewlett-Packard Company
Legal Department
1040 NE Circle Blvd.
Corvallis, OR 97330
Telephone: (503)715-4197
Fax: (503)715-8581

CLAIMS APPENDIX

1. (Previously Presented) A driver circuit for driving simultaneously a variable number of firing resistors for a printhead during a printing firing cycle, the driver circuit comprising:

a drive circuit for supplying firing pulses for firing the variable number of firing resistors during the printing firing cycle;

a circuit for adjusting a magnitude of a voltage or a current of said drive signal during the printing firing cycle in dependence on the variable number of firing resistors to be fired simultaneously in a given subset during the printing firing cycle.

2. (Original) The driver circuit of Claim 1, wherein said drive circuit is a voltage source, and said circuit adjusts a voltage magnitude of said drive signal.

3. (Original) The driver circuit of Claim 2, wherein said circuit adjusts the voltage magnitude in dependence on said variable number of firing resistors being simultaneously fired.

4. (Original) The driver circuit of Claim 3, wherein said circuit provides an increased voltage magnitude for larger variable numbers.

5. (Previously Presented) The driver circuit of Claim 2, wherein said drive circuit supplies a voltage of a predetermined magnitude, and said circuit applies a data variable offset voltage dependent on said variable number of firing resistors and a fixed offset voltage not dependent on said variable number of firing resistors.

6. (Original) The driver circuit of Claim 5, wherein said offset voltage is inversely proportional to the variable number of firing resistors.

7. (Original) The driver circuit of Claim 2, wherein said offset voltage is a monotonically increasing function of said variable number of firing resistors.

8. (Previously Presented) In a printhead control apparatus comprising a driver circuit for providing energy pulses to a set of firing resistor loads connected in parallel, each load having a switch for connecting the load to the driver circuit so that a variable number of the loads can be simultaneously connected to the driver circuit to receive energy pulses during a printing firing cycle, a method for maintaining nominally constant energy in an individual load, the method comprising:

determining the variable number of the loads to be simultaneously connected to an energy source for the printing firing cycle during a given subset of the printing firing cycle;

adjusting a voltage magnitude or current magnitude of the energy pulse in dependence on the variable number during the given subset of the printing firing cycle, so that the voltage magnitude or current magnitude increases as the variable number increases to maintain a nominally constant energy applied to the load independent of the variable number.

9. (Original) The method of Claim 8, further comprising:

adjusting a pulse width of the energy pulse in dependence on the variable number, so that the pulse width increases as the variable number increases.

10. (Original) The method of Claim 8, wherein said energy source is a voltage source for providing a supply voltage having a constant source voltage magnitude, and wherein:

said adjusting a voltage magnitude comprises applying a voltage offset to said constant source voltage magnitude, and wherein a value of said voltage offset is inversely proportional to the variable number.

11. (Previously Presented) A method for driving an inkjet printhead having a set of firing resistors, each responsive to a firing pulse for ejecting ink from a corresponding nozzle, the firing resistors connected in parallel, there being a parasitic resistance effectively in series connection with said set of firing resistors, each resistor having an

associated switch for connecting the resistor to a driver circuit so that a variable number of the resistors can be simultaneously connected to the driver circuit to receive energy pulses during a printing firing cycle, the method comprising:

determining the variable number of the loads to be simultaneously connected to the energy source for the printing firing cycle;

adjusting a voltage magnitude of the energy pulse in dependence on the variable number during a given subset of the printing firing cycle, so that the voltage magnitude increases as the variable number increases during the given subset of the printing firing cycle to maintain a nominally constant voltage applied to the load independent of the variable number.

12. (Original) The method of Claim 11, wherein said driver circuit includes a voltage source for providing a supply voltage having a constant source voltage magnitude, and wherein:

said adjusting a voltage magnitude comprises applying a voltage offset to said supply voltage, and wherein a value of said voltage offset is inversely proportional to the variable number.

13. (Previously Presented) A driver circuit for driving simultaneously a variable number of firing resistors for a printhead, the driver circuit comprising:

a drive circuit for supplying a drive signal for firing the variable number of firing resistors during a printing firing cycle;

means for adjusting a magnitude of a voltage or a current of said drive signal during the printing firing cycle in dependence on the variable number of firing resistors to be fired simultaneously in a given subset during the printing firing cycle.

14. (Original) The driver circuit of Claim 13, wherein said drive circuit includes a voltage source, and said adjusting means comprises means for adjusting a voltage magnitude of said drive signal.

15. (Original) The driver circuit of Claim 14, wherein said adjusting means comprises means for adjusting the voltage magnitude in dependence on said variable number of firing resistors being simultaneously fired.

16. (Original) The driver circuit of Claim 15, wherein said adjusting means provides an increased voltage magnitude for larger variable numbers.

17. (Previously Presented) The driver circuit of Claim 14, wherein said voltage supply supplies a voltage of a predetermined magnitude, and said adjusting means comprises circuit means for providing a data variable offset voltage dependent on said variable number of firing resistors and a fixed offset voltage not dependent on said variable number of firing resistors.

18. (Original) The driver circuit of Claim 17, wherein said offset voltage is inversely proportional to the variable number of firing resistors.

19. (Original) The driver circuit of Claim 13, wherein said magnitude is a monotonically increasing function of said variable number of firing resistors.

20. (Previously Presented) A driver circuit for firing simultaneously a variable number of firing resistors for associated nozzles in a printhead, the driver circuit comprising:

an energy source for providing electrical power to fire said firing resistors;

a nozzle counter for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given printing firing cycle;

a programmable offset generator for generating an output control voltage or current dependent on said nozzle count during a given subset of the given printing firing cycle;

a drive circuit having an output connected to a circuit output terminal for connection to the printhead, said drive circuit for selectively applying variable voltage or current from said energy source to the circuit output in dependence on said output control voltage or current during the given subset of the given printing firing cycle.

21. (Previously Presented) The circuit of Claim 20, wherein said energy source is a voltage source, and said programmable offset generator generates a data variable offset output control voltage of a magnitude dependent on said nozzle value and a fixed offset output control voltage of a magnitude not dependent on said nozzle value.

22. (Original) The circuit of Claim 21, wherein said output control voltage value is proportional to the variable number of firing resistors.

23. (Previously Presented) A driver circuit for driving simultaneously a variable number of firing resistors for associated nozzles in a printhead, the driver circuit comprising:

a voltage source for providing electrical power to fire said firing resistors;

a nozzle counter for determining a nozzle count of the variable number of nozzles whose resistors are to be fired in a given subset of a printing firing cycle;

a programmable offset generator for generating an output control voltage dependent on said nozzle count during the subset of the printing firing cycle;

a high side drive circuit having an output connected to a circuit output terminal for connection to the printhead, said high side drive circuit for selectively applying a firing pulse having a programmable magnitude to the circuit output in dependence on said output control voltage during the printing firing cycle or current.

24. (Original) The circuit of Claim 23, wherein said output control voltage value is proportional to the variable number of firing resistors.

EVIDENCE APPENDIX

(None)

RELATED PROCEEDINGS APPENDIX

(None)